

Further Notes on the Snail-collecting Aphis-lion Larva (Neuroptera: Chrysopidae).

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IDENTIFICATION, DISTRIBUTION AND SNAILS CARRIED.

Recently Dr. Roger C. Smith of Kansas State College, has examined the wing-venation of the snail-collecting aphis-lion, the larva of which has been previously described (Jones, 1929). He has tentatively identified it as *Nodita virginica* (Fitch). The specimen was collected two miles north of Bloomington, Indiana, but was in the pupal stage. After some time the adult emerged and the wings were mounted. These were later photographed by Calvin A. Richins of the University of Utah.

In addition to the above, I am indebted to the following for aid in the study of this species: Prof. H. R. Eggleston, Dr. R. G. Guthrie, Roy Ash, Ralph Alexander, and Paul Crone of Marietta College, Ohio; Adrienne Satterfield (now Mrs. Huston Newman) of West Union, Ohio; Dr. Fernandus Payne and Dr. A. C. Kinsey of Indiana University; Dr. Carl J. Drake and Dr. E. R. Becker of Iowa State College; Dr. R. V. Chamberlin and Dr. Don M. Rees of the University of Utah; and the officials of the Smithsonian Division of the Library of Congress, Washington, D. C.

Historically, the first mention that I have found of such a snail-carrying aphis-lion larva is that of Banks (1905) who erroneously placed it in the Hemerobiid, rather than in the Chrysopid family, as Smith (1926) later confirms. No locality record was given. I quote this first mention by Banks. "The larvae of *Hemerobius* appear to be much less known than allied forms; I have not bred any, but a larva given me by Mr. Schwarz probably belongs to this genus; it has a broader head, a shorter body than *Chrysopa*; and the lateral processes of the thorax are very long; this specimen was taken among fallen leaves and carried the empty shells of several small molluscs." Smith (1926) lists no snail-carrying larvae in his very fine discussion of trash-carrying Chrysopid larvae. The author (1929) described the external features of the larva now

under consideration, giving two localities: Vinton County, Ohio, approximately seven miles west of Albany, which is about twelve miles east of McArthur; and Squaw Hollow, near Marietta, Ohio. The numbers, unreported therein, were from these localities respectively: five, which were preserved; and one, which escaped. Subsequent to this publication one more living specimen was taken at Squaw Hollow. Observations have recently been made (Archer, 1938) on a similar Chrysopid, perhaps not the same species, in North Carolina and Alabama. He found only four specimens, one from each of the following four localities: Hayesville, North Carolina; Robbinsville Road in the northwest of Macon County, North Carolina; Clay, Jefferson County, Alabama; and Fort Payne, DeKalb County, Alabama. Archer reports the following species of snails carried: *Retinella indentata paucilirata*, *Retinella indentata carolinensis wetherbyi*, *Polygyra rugeli* juveniles, *Hawaiia minuscula*, *Euconulus sterkii*, *Euconulus chersinus*, and *Vertigo gouldii*. Two insect crania were also listed. As this paragraph contains all the literature resulting from a search of over ten years, it is evident that the literature is as meager, as the specimens are rare.*

During this time, however, the following locality records have accumulated for this species: Athens County, Ohio, midway between Torch and Coolville, five live specimens and two dead specimens; Meigs County, Ohio, two miles northeast of Rock Springs, near Chester, one live specimen; Morgan County, Ohio, on Turkey Run, one mile west of Stockport, one pupal case with snails intact, from which the adult insect had emerged; Adams County, Ohio, at Hill's Fork on the Panhandle Road, one living specimen; and Bloomington, Indiana, two live specimens, and one pupa from which the adult emerged, the wings of which are mentioned above.

The snails carried on the Ohio and Indiana specimens are of the following species: *Punctum pygmaeum* (Drap.), *Euconulus*

* Since this paper was submitted, Dr. Roger C. Smith has called attention to my overlooking the article by Gordon K. MacMillan. January, 1939, A snail. "taxi." Naut. Vol. 52, No. 3, pp. 94-95. He thinks that the specimens Mr. MacMillan has are "unquestionably Chrysopid" rather than Hemerobiid.

fulvus (Müller) *Striatura milium* (Morse); *Carychium exiguum* (Say), *Strobilops labyrinthica* (Say), and *Cochlicopa lubrica* (Müller). The first two seem to be favorites, as they are chosen far more often than the proportion in which these species occur in the natural fauna. Fragments of insect skeletons are also often used.

BEHAVIOR, LOCOMOTION, TROPISMS AND FEEDING.

The following observations on behavior chiefly of the Athens County specimens are submitted. Animals mechanically prodded "play possum", recovering in from ten to fifteen seconds if undisturbed. In walking there is a peculiar "feeling" or exploratory movement every few steps by the piercing spears. The animals at room temperature attained the following speeds in walking for thirty second periods: 11 cm. (including stops), 10 cm. (including stops), 16 cm., 16 cm., and 16 cm. The last three were non-stop promenades. While the leg action is ordinary (the first and third femora on one side moving in the same direction, while the second on the same side is moving in the opposite direction), they have a "hitching" stride. The spears can be approximated, and frequently are, when the animal stops. The animal stops "jeep-like", with head down and flattened against the table, the hind legs elevated thus raising the abdomen.

When turned over on their backs, they somersault to regain the upright position instead of turning sidewise. Sometimes they somersault spears first. At other times they recover by placing the last pair of legs down first and then flopping over.

They dislike excess moisture. They prefer a rather dry habitat of dead leaves. They choose dry instead of wet or moist surfaces. When placed in the light they turn and travel in the other direction. The more intense the light, the faster they travel, seeking darkness or at least shade. They respond negatively to heat, avoiding the warm dry hand or finger. They travel with equal facility on all inclines. They travel as easily vertically downward as vertically upward. When a vertical plane is placed at right angles to their course, they go up over it, rather than crawling along the junction of the plane with the table. In this they appear to be negatively thigmotropic,